

What is claimed is:

- 1 1. A field effect transistor (FET), comprising:
2 a metal oxide gate insulator disposed over a substantially intrinsic layer of
3 silicon which overlies a substrate.
- 1 2. The FET of Claim 1, wherein the metal oxide comprises an oxide of
2 hafnium.
- 1 3. The FET of Claim 1, wherein the metal oxide comprises an oxide of
2 zirconium.
- 1 4. The FET of Claim 1, wherein the metal oxide is an oxide of a rare earth
2 element that has a higher heat of formation than silicon dioxide.
- 1 5. The FET of Claim 1, wherein the substantially intrinsic layer of silicon is an
2 epitaxial layer.
- 1 6. The FET of Claim 4, further comprising a gate electrode overlying the
2 metal oxide layer; and source/drain terminals disposed in the substrate
3 substantially adjacent the gate electrode.
- 1 7. The FET of Claim 5, wherein the epitaxial layer has a thickness in the
2 range of approximately 10 angstroms to 20 angstroms.

- 1 8. A method of forming a dielectric layer, comprising:
 - 2 forming an oxide layer on a surface of a substrate;
 - 3 forming a metal layer over the oxide layer;
 - 4 forming a capping layer over the metal layer; and
 - 5 reacting the metal layer with the oxide layer.

- 1 9. The method of Claim 8, wherein the substrate comprises a silicon wafer,
 - 2 and the oxide layer is an oxide of silicon.

- 1 10. The method of Claim 8, wherein forming the metal layer comprises
 - 2 depositing a layer of a metal which does not react with silicon to form a silicide.

- 1 11. The method of Claim 8, further comprising removing the capping layer.

- 1 12. The method of Claim 8, wherein the capping layer comprises titanium
 - 2 nitride, and further comprising removing the capping layer by a selective wet
 - 3 etch; and further comprising removing unreacted metal from a surface of the
 - 4 metal oxide layer.

- 1 13. A method of forming a dielectric layer, comprising:
 - 2 forming an oxide layer on a surface of a substrate;
 - 3 forming a metal layer over the oxide layer; and

4 reacting at least a first portion of the metal layer with the oxide layer.

1 14. The method of Claim 13, further comprising reacting a second portion of
2 the metal layer with an oxidizing ambient.

1 15. The method of Claim 13, wherein reacting at least a first portion of the
2 metal layer with the oxide layer comprises heating to a temperature greater than
3 approximately 600°C.

1 16. A method of forming a field effect transistor, comprising:
2 growing a silicon dioxide layer on a surface of a silicon wafer;
3 depositing a metal layer superjacent the silicon dioxide layer;
4 depositing a capping layer superjacent the metal layer;
5 converting the silicon dioxide layer and the metal layer to an epitaxial
6 silicon layer and a metal oxide layer;
7 removing the capping layer;
8 forming a gate electrode over the metal oxide; and
9 forming source/drain terminals substantially adjacent the gate electrode.

1 17. The method of Claim 16, wherein forming the metal layer comprises
2 depositing a metal; and the metal is selected from the group consisting of
3 hafnium and zirconium.

1 18. The method of Claim 16, wherein forming the capping layer comprises
2 depositing a titanium nitride layer.

1 19. The method of Claim 18, wherein depositing comprises a physical vapor
2 deposition.

1 20. The method of Claim 16, wherein converting the silicon dioxide layer and
2 the metal layer to an epitaxial silicon layer and a metal oxide layer comprises
3 heating the wafer.

1 21. The method of Claim 16, wherein removing the capping layer comprises a
2 selective wet etch.

1 22. A method of forming a field effect transistor, comprising:
2 growing a silicon dioxide layer on a surface of a silicon wafer;
3 depositing a metal layer superjacent the silicon dioxide layer;
4 converting the silicon dioxide layer and the metal layer to an epitaxial
5 silicon layer and a metal oxide layer;
6 forming a gate electrode over the metal oxide; and
7 forming source/drain terminals substantially adjacent the gate electrode.

1 23. The method of Claim 22, wherein forming the metal layer comprises
2 depositing a metal; and the metal is selected from the group consisting of
3 hafnium and zirconium.

1 24. The method of Claim 23, wherein depositing comprises a physical vapor
2 deposition.

1 25. The method of Claim 22, wherein converting the silicon dioxide layer and
2 the metal layer to an epitaxial silicon layer and a metal oxide layer comprises
3 heating the wafer in a low pressure reaction chamber.

1 26. The method the Claim 25, wherein the reaction chamber is the same
2 reaction chamber in which the metal layer is formed.